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LIVING BACTERIA IN ANCIENT ROCKS AND METEORITES

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The recent newspaper publicity accorded the investigations of Lipman on "Are there Living Bacteria in Stony Meteorites?"[2] cannot but be disturbing to the minds of earnest searchers for truth, especially when the supposed findings fail of corroboration in other laboratories.

Professor Lipman's technique and interpretation are open to serious question, as had already been indicated by investigators who failed to verify his "discovery" of bacteria in anthracite coal. A brief review of the work on living organisms in ancient rocks and in meteorites may help to clarify some of the misconceptions that have taken root in the minds of the reading public as a result of the broadcasting of such engrossing observations.

The possible occurrence of bacteria in ancient rocks has been suggested before. European investigators (Galle in 1910–1911, Schroeder in 1914, and Lieske and Hoffman in 1929) carried on various studies to determine whether the bacteria found were responsible for the production of coal gas in the mines, and at what depth of the earth's crust bacteria may actually be recovered. Lipman very briefly reported (Science, 1928) the finding of bacteria in pre-Cambrian rock. This was followed by a report of his "discovery" (Journ. Bact., 1931) of bacteria in anthracite coal, in which he claimed that these bacteria had existed in the coal since the time of its formation, a matter of millions of years, depending on the geological time-table used. Farrell and Turner (Journ. Bact., 1931) attempted to verify Lipman's findings on coal, but were unable to do so except in coal that was fractured and had become infiltrated with bacteria as a result of the seepage of surface and mine water. The micro-organisms found in this cracked coal, and in the mine water and mine soil, were apparently identical with those described by Lipman, and were such as are commonly found in air, soil and water. No bacteria were found in coal that was not fractured or cracked.

In December, 1932 (American Museum Novitates No. 588) Lipman reported the finding of living bacteria in stony meteorites, having

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[2]Lipman, Chas. B., 1932, Amer. Mus. Novitates, No. 588.

followed essentially the same technique as in his previous work. These micro-organisms are regarded by him as inhabitants of another planet.

In any bacteriological investigation of this kind, a large part of the emphasis should be placed, not only upon the objects sought, but upon preventing bacteria, yeasts and moulds that are present in the air, and all objects exposed to air, dust, water, etc., from gaining entrance to the material under study. The technique employed by Lipman in the preparation of glassware and culture media was, without doubt, beyond reproach. It is not so apparent that the surface of the various meteorites was actually freed from all foreign bacteria, and that the crushing and the handling of the powdered meteorites were carried out aseptically. Lipman attempts to answer these anticipated rejoinders in a positive vein, claiming that the utmost precautions were used in conducting this part of the investigation.

Lipman's work is divided into three parts. In his review of the third and final group of experiments he states that all foreign living micro-organisms were removed from the surface of the meteorite, and that the meteorite was then crushed and the crushed material inoculated into sterile culture media.

In the crushing and handling of the ground material there was every possibility of contamination. Prevention of contamination of the meteorites during the process of crushing alone must appear to trained bacteriologists as an almost insurmountable task. The author states (page 17) that, after perfecting the sterile procedure used in his final set of experiments, upon which, we must assume, his main emphasis and interpretation are based, some foreign bacteria were found as contaminants. If such contamination was possible, after all the aseptic precautions that were taken, is it not also possible that all of the bacteria observed were contaminants?

Aside from the above considerations, would it necessarily follow that, if bacteria did perchance exist in meteorites, they had come down from the skies? Is it not possible that they might have gained entrance after reaching the earth? Lipman anticipates this question, and answers it by declaring that one of the sixteen meteorites had little or no contact with the earth, and that this statement invalidates such a criticism. This must appear to everyone as a strange form of logic. Since only one meteorite is claimed to have had little or no contact with the earth, how can his statement invalidate such a criticism against the other fifteen meteorites, upon which over 90% of his work is based. An inquiry into the history of the sixteen meteorites used in this work reveals that they

were found between 1868 and 1924; several of them have no definite age history. It is not known when the meteorites fell; the available records show only when they were picked up. In any event, these meteorites have been in contact with the earth during an unknown interval of time, and have been exposed to the air and to weathering from 8 to 65 years, at least. The weathering involved contraction and expansion which would provide an easy means of ingress for bacteria and other microorganisms. This weathering could occur in a museum as well as outside. Dust, dirt and water may have carried bacteria into fissures in these as well as in other rocks. The cracks containing bacteria may have become sealed over during later weathering processes and remained closed for a long period of years. The treatment of the surface with disinfectants would not necessarily kill the bacteria in the sealed cracks.

The situation regarding the alleged presence of living bacteria in meteorites is but little different from that which concerns bacterial life in anthracite coal. Living bacteria are of common occurrence in soil, air and water. One sample of anthracite coal examined by Lipman was obtained for him from a mine in Pennsylvania, 3,000 miles distant from his laboratory, and his ambitious interpretation was made without his having seen the mine or having any definite knowledge of the geological formation of the area. In this work on meteorites, spectacular interpretations are again made when little or nothing is known concerning the past history of the meteorites studied. Until such interpretations are based on much more convincing and fool-proof observations, Lipman's excursions into the field of life beyond this globe must be considered as a flight of imagination through space.